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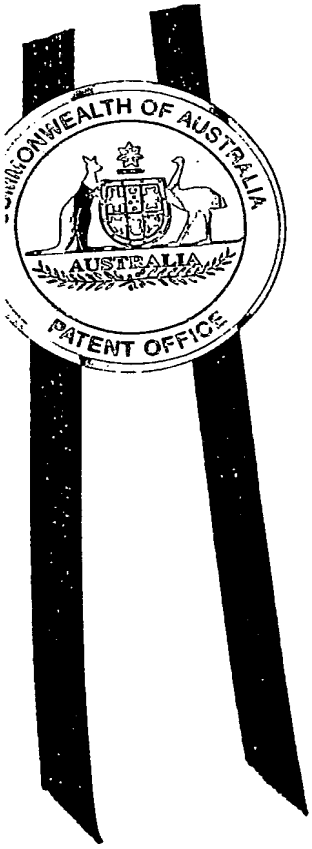

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Seventh day of December 2004

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Patents Act 1990

Weatherford Australia Pty Limited

PROVISIONAL SPECIFICATION

Invention Title:

A screening module

The invention is described in the following statement:

A screening module

Field of the Invention

This invention relates to the screening of materials. More particularly, the invention relates to a screening module for use in a screening assembly which screens material to classify or sought the material. The invention also relates to a screening assembly including the screening module.

Background to the Invention

Screening arrangements are widely used in the mining industry, particularly the coal mining industry, for the screening or classifying of ores and slurries. Material to be screened is passed over a vibratory screen deck. Apertures of screening panels arranged on the screen deck pass material having dimensions smaller than the apertures of the screen panels while materials having dimensions larger than those of the screening apertures are retained on a top surface of, and traverse, the panels of the screen deck for further processing.

Particularly with very fine apertures, the rigidity of the screening panel must be retained so that the apertures do not distort and pass materials larger than the aperture size. However, with these fine apertures, there is a danger of the apertures becoming blocked or blinding so that, what may be undesirable material, traverses the screen deck and is also subjected to further processing.

There is therefore a compromise between the need for a rigid panel and the need to inhibit blinding of the apertures.

Summary of the Invention

According to the invention, there is provided a screening module for a screening assembly, the screening module including:

a panel member having a pair of opposed, parallel sides and a pair of opposed parallel ends;

a mounting formation arranged about at least a part of a periphery of the panel member for mounting the panel member on an underlying frame of a screen deck;

a plurality of discrete aperture arrays defined in a surface of the body member;

a skirt portion circumscribing each aperture array, each skirt portion depending from a lower surface of the panel member; and

a reinforcing arrangement arranged beneath each aperture array, the reinforcing arrangement being bounded by its associated skirt portion.

Each aperture array may be substantially rectangular (including square) when viewed in plan or from below.

Each reinforcing arrangement may include a reinforcing member extending from a part of the skirt portion on one side of its associated aperture array to a part of the skirt portion on the opposed side of the aperture array. Preferably, the reinforcing member is a bar-shaped element or rib which is substantially centrally arranged beneath the aperture array.

Secondary reinforcing elements may extend outwardly from the reinforcing member. The secondary reinforcing elements may be in the form of a series of spaced, parallel fin-like elements arranged at substantially right angles to the reinforcing member and extending from the reinforcing member to the skirt portion.

Steel reinforcing may be omitted from the module. Instead, steel reinforcing may be arranged in the mounting formation and/or in the panel member itself in regions between the aperture arrays. Where steel reinforcing, for example, round bar is used, it may be at least partially embedded in the panel member, between the aperture arrays, to control module shrinkage. The reinforcing arrangement may be without steel reinforcing.

The mounting formation may be in the form of a plurality of clips. The clips may be integrally formed with the panel member as a one-piece unit. The clips may extend along both ends and both sides of the panel member.

In this regard, it is to be noted that the panel member may be substantially rectangular in outline with the ends shorter than the sides. The apertures, which may be in the form of slits, may extend parallel to the ends. The ends may be arranged parallel to a direction of flow of material over the screening deck, in use. Instead, the slits may be arranged at right angles to the ends to provide a cross-flow arrangement..

As indicated above, steel reinforcing may be omitted from the screening module. To provide sufficient rigidity for the module, a screening assembly may include an underlying support frame. The support frame may have rails to be engaged by the clips. In addition, the support frame may include support members which underlie the panel member of each screening module. Thus, it will be appreciated that the support members span the space between adjacent, parallel rails of the frame.

The skirt portions may be arranged such that channels are defined between adjacent parts of skirt portions of adjacent aperture arrays. These channels may be dimensioned to be a sliding fit over the support members. The dimensions of each channel may be such that the underlying support member is a tight fit in the channel. However, vertical displacement of the screening module relative to the underlying

support member may still be possible so as to permit a degree of damped, or controlled, sliding movement between the skirt portions and the support members to allow dislodging of material potentially blinding apertures of the screening module by the panel member of the screening module impacting against the support members. It will therefore be appreciated that the skirt portions grip the support members without engaging them in a clipping or locking manner.

The invention extends also to a screening assembly which includes

a plurality of screening modules, as described above; and

a demountable framework on which the screening modules are removably mounted.

Brief Description of the Drawings

The invention is now described by way of example with reference to the accompanying drawings in which:-

Figure 1 shows a plan view of a screening module in accordance with an embodiment of the invention;

Figure 2 shows a side view of the screening module;

Figure 3 shows an end view of the screening module; and

Figure 4 shows, on an enlarged scale, a bottom view of a part of the screening module.

Detailed Description of the Preferred Embodiment

In the drawings, reference numeral 10 generally designates a screening module, in accordance with the invention.

The module 10 comprises a panel member 12 defining a plurality of aperture arrays 14. It will be noted that an aperture array is a part of the panel member 12 and has a matrix of apertures. Each array 14 is separated by solid material 16.

The screening module 10 includes a mounting formation 18 in the form of a plurality of clips 20, 24. A clip 20 is provided at each end 22 of the panel member 12. In addition, a clip 24 is provided along each side 26 of the panel member 12. The panel member 12 is substantially rectangular in shape having shorter ends 22 and longer sides 24. In use, the ends are arranged parallel to a directional flow of material over the panel member 12 as generally indicated by the arrow 30. It is also to be noted that the apertures 28 of each aperture array 14 are in the form of elongate openings, such as slits. The apertures 28 extent in a direction parallel to that of the flow of material, i.e.

parallel to the ends 22 of the panel member 12. In a cross-flow module 10, the apertures 28 are arranged at right angles to the ends 22 of the panel member 12.

In addition, it will be noted that the clips 20, 24 are integrally formed with the panel member 12 as a one piece moulding. The screening module 10 is a moulding of a suitable polyurethane material having the requisite hardness. In this regard, the module 10 preferably, but not essentially, excludes any form of steel reinforcing and, as such, is made of a harder polyurethane, typically a polyurethane having a Shore Hardness of 93A or 95A.

The apertures 28 of the aperture arrays 14 of the panel member 12 typically have a width of from about 0.2 mm to 5 mm, in particular about 0.3 mm to 3 mm and, optimally, about 0.5 mm to pass materials smaller than half a millimetre therethrough. To cater for such fine apertures, a thinner section of polyurethane is required.

To ensure that this thinner section of polyurethane is not too flexible, each aperture array 14 has a reinforcing arrangement 32 associated with it. Each reinforcing arrangement 32 is arranged on a lower surface of the panel member 12 below its associated aperture array 14. The reinforcing arrangements 32 are also of polyurethane and are integrally moulded with the panel member 12 as a one-piece moulding.

One of the reinforcing arrangements 32 is shown in greater detail in Figure 4 of the drawings which shows a bottom view of part of the screening module 10. It is to be noted that the apertures 28 are omitted from Figure 4 for the sake of clarity.

The reinforcing arrangement 32 of each aperture array 14 comprises a skirt portion 34 depending downwardly from a lower surface 36 of the panel member 12. This is best seen in Figure 2 of the drawings. For an eight aperture arrangement as shown in the drawings, the aperture array 14 is substantially square in outline so that the skirt portion 34 bounds a substantially square region. For other aperture arrays, such as a three aperture array (not shown) where three arrays are spaced equally over the panel member 12, the aperture arrays are substantially rectangular and the skirt portion bounds a rectangular region. A reinforcing member in the form of a rib 38 extends between opposed parts 34.1 of the skirt portion 34. Secondary reinforcing elements in the form of fins 40 project laterally from the rib 38 to the other opposed sides 34.2 of the skirt portion 34. With this arrangement, each aperture array 14 is reinforced to inhibit excessive flexing of the aperture arrays 14.

As a result of adjacent parts 34.2 of adjacent skirt portions 34 and, similarly, adjacent parts 34.1 of adjacent skirt portions 34 of the aperture arrays 14, channels 42 and 44, respectively, are defined between adjacent aperture arrays 14 as best seen in Figures 2 and 3 of the drawings.

These channels 42, 44 are dimensioned so that underlying support members (not shown) of a framework (also not shown), via which the screening modules 10 are mounted on a screen deck, are a tight fit to control, but not entirely eliminate, sliding movement in a direction perpendicular to a plane in which the panel member 12 lies. The support members are, to a large extent, gripped by these channels 42, 44 with the support members assisting in imparting rigidity to the screening modules 10. It is to be noted that the channels 42, 44 are deeper than a slot 43 adjacent the clip 20 to accommodate the support members of the framework therein.

Those skilled in the art will appreciate that the framework also carries rails thereon which are engaged by the clips 20, 24 of the screening modules 10.

These channels 42, 44 receive the steel support members therein. However, as indicated above, the panel member 12 is still allowed to slide vertically, to a limited extent, with respect to the support members, which aids in clearing blocked apertures 28 of the aperture arrays 14 of the panel member 12.

It is therefore an advantage of the invention that a screening module 10 is provided which has sufficient flexibility to inhibit blinding of the apertures 28 but is rendered sufficiently rigid, due to the reinforcing arrangements 32 and the cooperation with the support members of the underlying framework, to screen materials passing over the screening modules 10 with the required degree of accuracy. The fact that the support members are not clipped to the underside of the panel member 12 also facilitates clearing of blocked apertures 28 of the screening module 10 as relative movement between the screening module 10 and the support members is permitted.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

Dated this twenty-fifth day of November 2003

Weatherford Australia Pty Limited
Patent Attorneys for the Applicant:

F B RICE & CO

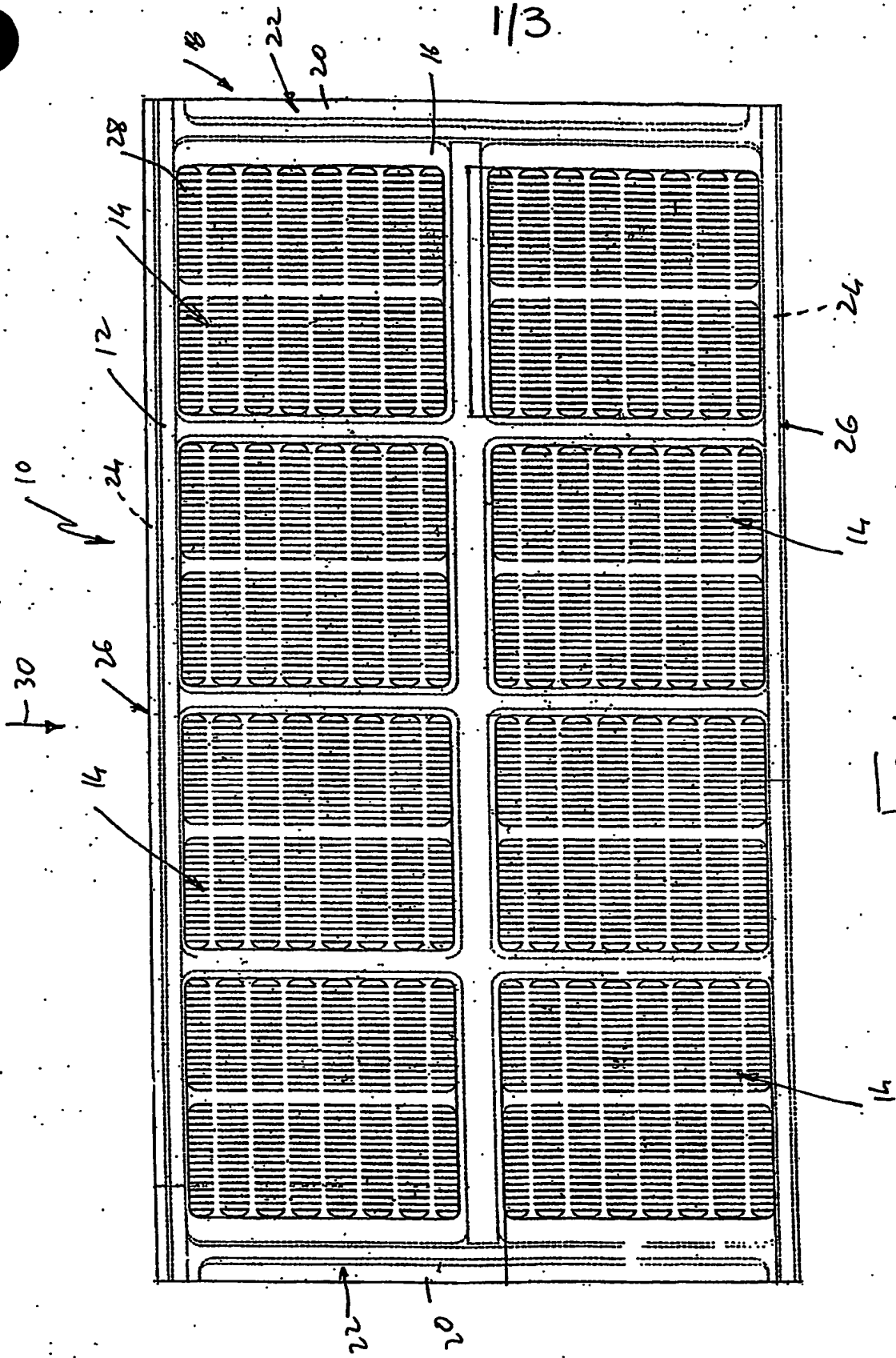

FIG. 1

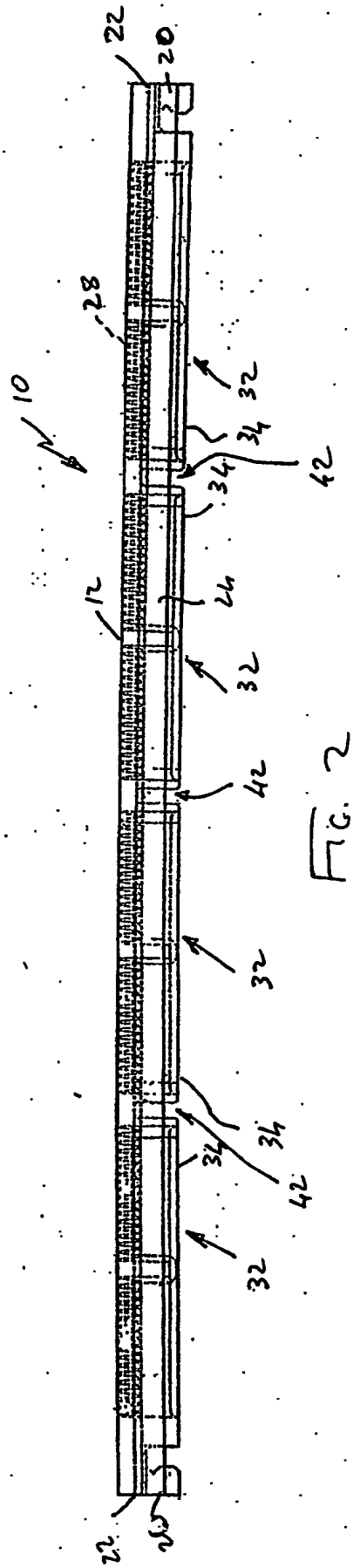
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FIG. 2

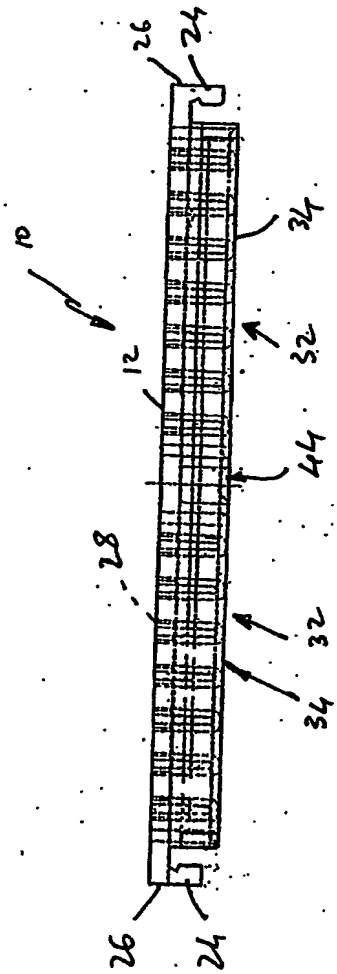
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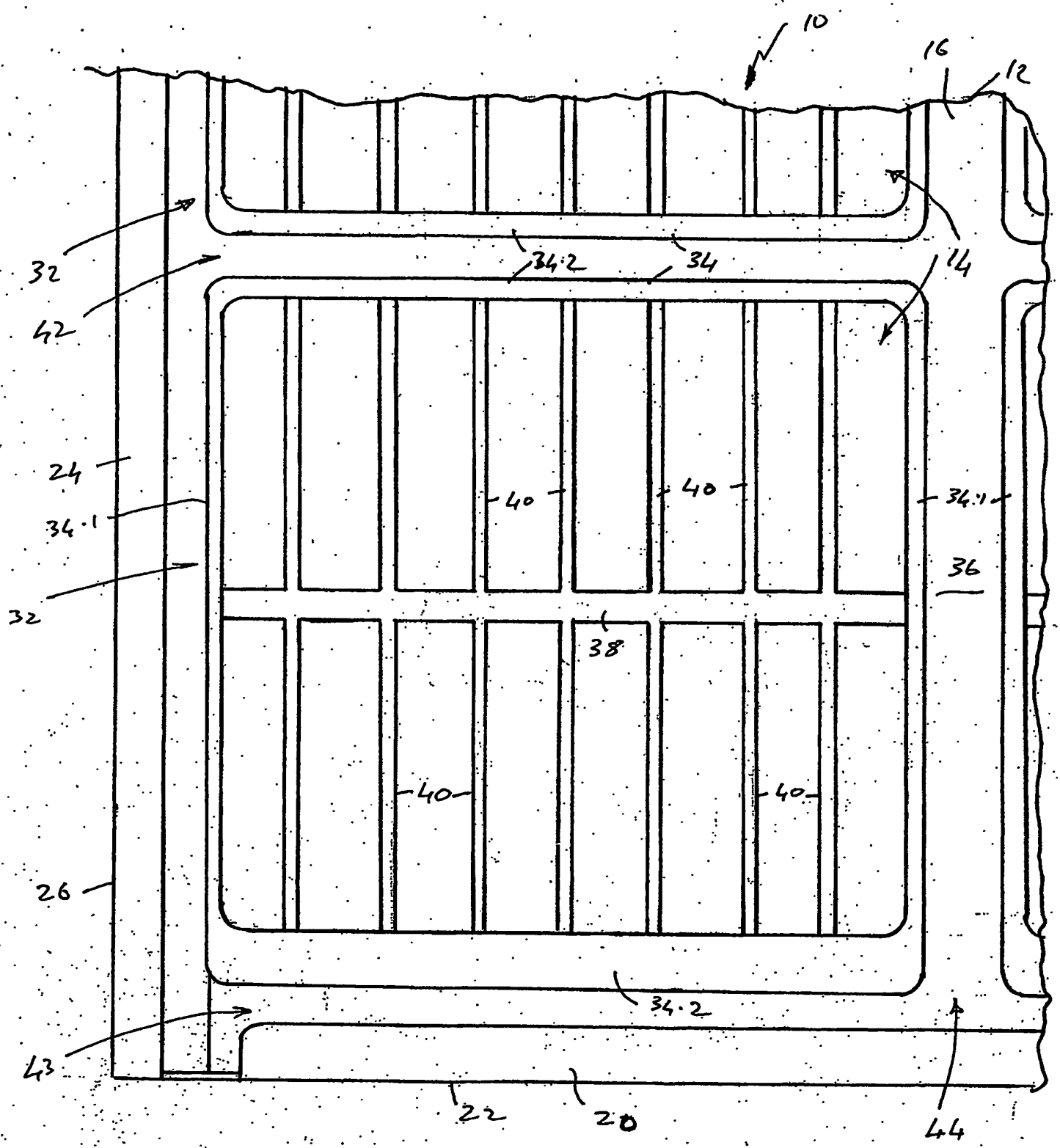
FIG. 3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34.1
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34.2
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Fig. 4

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